

We claim:

1. A wood preservative composition comprising: ✓

(a) an inorganic component selected from the group consisting of a metal, metal compound and combinations thereof; and

5 (b) one or more organic biocides

wherein at least the inorganic component or the organic biocide is present as micronized particles.

10 2. The composition of claim 1 wherein the inorganic component is present as micronized particles.

3. The composition of claim 1, wherein the organic biocide is present as micronized particles.

15 4. The composition of claim 1, wherein both the inorganic component and the organic biocide are present as micronized particles.

20 5. The composition of claim 2, wherein the inorganic component is selected from the group consisting of copper, cobalt, cadmium, nickel, tin, silver, zinc and compounds thereof.

6. The composition of claim 2 wherein the micronized inorganic component is copper, copper compound or combinations thereof.

25 7. The composition of claim 6, wherein the copper compounds are selected from the group consisting of copper hydroxide, copper oxide copper carbonate, basic copper carbonate, copper oxychloride, copper 8-hydroxyquinolate, copper dimethyldithiocarbamate, copper omadine and copper borate.

30 8. The composition of claim 1 wherein the micronized particles have a size of between 0.005 microns to 25 microns.

9. The composition of claim 8 wherein the micronized particles have a size of between 0.005 to 10.0 microns.

5 10. The composition of claim 9 wherein the micronized particles have a size of between 0.05 to 10.0 microns.

11. The composition of claim 10 wherein the size of the micronized particles is between 0.05 to 1.0 microns.

10 12. The composition of claim 7 wherein the organic biocide is selected from the group consisting of biocides listed in Table 1.

13. The composition of claim 1, wherein the inorganic component is copper carbonate or copper hydroxide and the organic biocide is a quaternary ammonium compound  
15 selected from the group consisting of alkyldimethylbenzylammonium chloride, dimethyldidecylammonium chloride and dimethyldidecylammonium carbonate.

14. The composition of claim 13, wherein the inorganic component is copper carbonate and the organic biocide is dimethyldidecylammonium carbonate.

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15. The composition of claim 14, wherein the size of the copper carbonate particles is between 0.05 and 1.0 microns.

16. The composition of claim 12, wherein the inorganic component is copper  
25 carbonate and the organic biocide is tebuconazole.

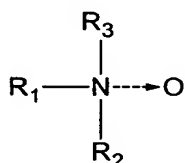
17. The composition of claim 1, wherein the inorganic component is a water soluble metal compound and the organic biocide is present as micronized particles.

30 18. The composition of claim 17, wherein the inorganic component is selected from the group consisting of copper nitrate, copper sulfate and copper acetate.

19. The composition of claim 1, further comprising an agent selected from the group consisting of water repellants, colorants, emulsifying agents, dispersants, stabilizers and UV inhibitors.

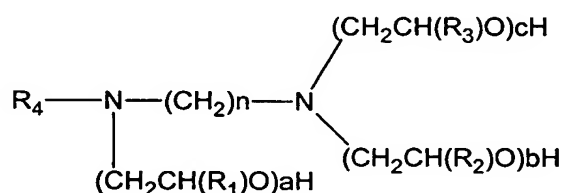
20. The composition of claim 1, further comprising one or more enhancing agents.

21. The composition of claim 20, wherein the enhancing agent is a trialkylamine oxide having the following structure:



where  $R_1$  is a linear or cyclic  $C_8$  to  $C_{40}$  saturated or unsaturated group and  $R_2$  and  $R_3$  independently are linear  $C_1$  to  $C_{40}$  saturated or unsaturated groups.

22. The composition of claim 20, wherein the enhancing agent is an alkoxyated diamine having the following structure:



where  $n$  is an integer which can vary from 1 to 4;  $R_1$ ,  $R_2$  and  $R_3$  are independently selected from the group consisting of hydrogen, methyl, ethyl and phenyl;  $a$ ,  $b$  and  $c$  are each integers from 1 to 6; and  $R_4$  is fatty alkyl of  $C_8$  to  $C_{22}$ .

23. A method for preserving a wood product comprising the step of contacting the product with a wood preservative composition comprising: (a) an inorganic component

selected from the group consisting of a metal, metal compound and combinations thereof; and  
(b) one or more organic biocides,

wherein at least the inorganic component or the organic biocide is present as  
micronized particles.

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24. The method of claim 22, further comprising the step of pressure treating the  
wood product with the preservative composition.

25. The method of claim 23, wherein both the inorganic component and the  
10 organic biocide are present as micronized particles.

26. The method of claim 23, wherein the inorganic component is selected from the  
group consisting of copper, cobalt, cadmium, nickel, silver, tin, zinc and compounds thereof.

15 27. The method of claim 23, wherein the inorganic component is selected from the  
group consisting of copper, copper hydroxide, copper oxide copper carbonate, basic copper  
carbonate, copper oxychloride, copper 8-hydroxyquinolate, copper dimethyldithiocarbamate,  
copper omadine and copper borate.

20 28. The method of claim 23, wherein the inorganic component is copper carbonate  
or copper hydroxide and the organic biocide is a quaternary ammonium compound selected  
from the group consisting of alkyl dimethylbenzylammonium chloride,  
dimethyldidecylammonium chloride and dimethyldidecylammonium carbonate.

25 29. The method of claim 25, wherein the inorganic component is copper carbonate  
and the organic biocide is dimethyldidecylammonium carbonate.

30 30. The method of claim 29, wherein the size of the copper carbonate particles is  
between 0.05 and 1.0 microns.

31. The method of claim 23, wherein the inorganic component is copper carbonate  
and the organic biocide is tebuconazole.

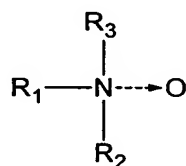
32. The method of claim 23, wherein the inorganic component is a water soluble metal compound and the organic biocide is present as micronized particles.

33. The method of claim 32, wherein the inorganic component is selected from the group consisting of copper nitrate, copper sulfate and copper acetate.

34. The method claim 23, wherein the composition for treating wood further comprises an agent selected from the group consisting of water repellants, colorants, emulsifying agents, dispersants, stabilizers and UV inhibitors.

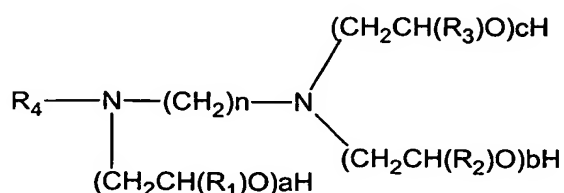
35. The method of claim 23, wherein the composition for treating wood further comprises one or more enhancing agents.

36. The method of claim 35, wherein the enhancing agent is a trialkylamine oxide having the following structure:



where  $\text{R}_1$  is a linear or cyclic  $\text{C}_8$  to  $\text{C}_{40}$  saturated or unsaturated group and  $\text{R}_2$  and  $\text{R}_3$  independently are linear  $\text{C}_1$  to  $\text{C}_{40}$  saturated or unsaturated groups.

37. The method of claim 35, wherein the enhancing agent is an alkoxyated diamine having the following structure:



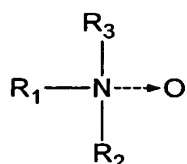
where n is an integer from 1 to 4; R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are independently selected from the group consisting of hydrogen, methyl, ethyl and phenyl; a, b and c are each integers from 1 to 6; and R<sub>4</sub> is fatty alkyl of C<sub>8</sub> to C<sub>22</sub>.

- 5            38.    A method for wood preservation comprising the steps of treating wood with a composition comprising micronized particles selected from the group consisting of metal, metal compounds and combinations thereof, wherein the size of the particles is between 0.005 and 25 microns.
- 10           39.    The method of claim 38, wherein the micronized particles are selected from the group consisting of copper, cobalt, cadmium, nickel, silver, tin and compounds thereof.
40.    The method of claim 38, wherein the micronized particles comprise metal and/or metal compounds selected from the group consisting of copper, copper hydroxide, 15 copper oxide copper carbonate, basic copper carbonate, copper oxychloride, copper 8-hydroxyquinolate, copper dimethyldithiocarbamate, copper omadine, copper borate and combinations thereof.
41.    The method of claim 40, wherein the particle size is between 0.005 and 10 20 microns.
42.    The method of claim 41, wherein the particle size is between 0.05 and 1.0 microns.
- 25           43.    The method of claim 40, wherein the treatment of wood is carried out by a process selected from the group consisting of pressure treatment, spraying, dipping and brushing.
44.    The method of claim 43, wherein the treatment of wood is carried out by 30 pressure treatment.

45. The method of claim 38 wherein the wood is treated with a composition further comprising an agent selected from the group consisting of water repellants, colorants, emulsifying agents, dispersants, stabilizers and UV inhibitors.

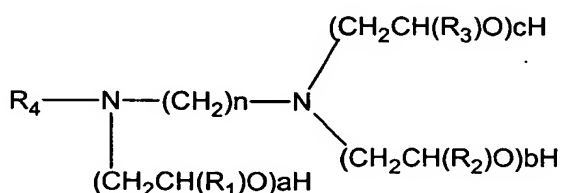
46. The method of claim 38, wherein the wood is treated with a composition further comprising one or more enhancing agents.

47. The method of claim 46, wherein the enhancing agent is a trialkylamine oxide having the following structure:



where  $\text{R}_1$  is a linear or cyclic  $\text{C}_8$  to  $\text{C}_{40}$  saturated or unsaturated group and  $\text{R}_2$  and  $\text{R}_3$  independently are linear  $\text{C}_1$  to  $\text{C}_{40}$  saturated or unsaturated groups.

48. The method of claim 46, wherein the enhancing agent is an alkoxyated diamine having the following structure:



where  $n$  is an integer from 1 to 4;  $\text{R}_1$ ,  $\text{R}_2$  and  $\text{R}_3$  are independently selected from the group consisting of hydrogen, methyl, ethyl and phenyl;  $a$ ,  $b$  and  $c$  are each integers from 1 to 6; and  $\text{R}_4$  is fatty alkyl of  $\text{C}_8$  to  $\text{C}_{22}$ .

49. A wood preservative composition comprising a dispersion of micronized particles selected from the group consisting of copper, copper hydroxide, copper carbonate,

basic copper carbonate, copper oxychloride, copper 8-hydroxyquinolate, copper dimethyldithiocarbamate, copper omadine, copper borate and combinations thereof, wherein the size of the particles is between 0.005 to 25 microns.

50. The composition of claim 49, wherein the size of the particles is between 0.005 and 10 microns.

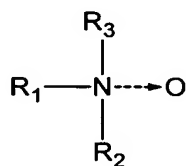
51. The composition of claim 50, wherein the size of the particles is between 0.05 and 10 microns.

52. The composition of claim 51, wherein the size of the particles is between 0.05 and 1.0 microns.

53. The composition of claim 49, further comprising an agent selected from the group consisting of water repellants, colorants, emulsifying agents, dispersants, stabilizers and UV inhibitors.

54. The composition of claim 49, further comprising one or more enhancing agents.

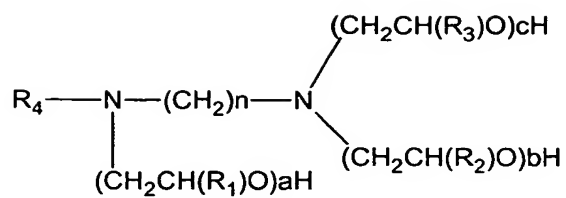
55. The composition of claim 54, wherein the enhancing agent is a trialkylamine oxide having the following structure:



where  $R_1$  is a linear or cyclic  $C_8$  to  $C_{40}$  saturated or unsaturated group and  $R_2$  and  $R_3$  independently are linear  $C_1$  to  $C_{40}$  saturated or unsaturated groups.

56. The composition of claim 54, wherein the enhancing agent is an alkoxyated diamine having the following structure:





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where n is an integer from 1 to 4; R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are independently selected from the group consisting of hydrogen, methyl, ethyl and phenyl; a, b and c are each integers from 1 to 6; and R<sub>4</sub> is fatty alkyl of C<sub>8</sub> to C<sub>22</sub>.

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